WEST Search History

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DATE: Friday, August 17, 2007

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	DB=USPT; PLUR=YES; OP=OR		
☐	L9	L8 and l5	62
☐	L8	L7 and l2	82
☐	L7	l1 and l3	3079
☐	L6	L5 and l4	140
☐	L5	@ad<20010322	3230655
☐	L4	L3 and l2	193
☐	L3	time near5 series	43507
☐	L2	705/35	2585
☐	L1	trend	105439

END OF SEARCH HISTORY

L9: Entry 10 of 62 File: USPT Jul 4, 2006

DOCUMENT-IDENTIFIER: US 7072863 B1
** See image for Certificate of Correction **
TITLE: Forecasting using interpolation modeling

Application Filing Date (1):
19990908

Brief Summary Text (23):
Almost as long as there have been measurements of economic data, people have attempted to formulate forecasts of prices and economic activity by using a variety of techniques. During the past fifty years, several distinct methodologies for producing economic forecasts have been explored. Some of the most important include large-scale econometric systems, time series methods, computationally intensive techniques, opinion polling, and combination methods.

Brief Summary Text (26):
Approximately thirty years ago, a group of econometricians, predominantly of British origin, began to develop alternative economic prediction methods. Foremost, single equation models using "time series" techniques popular in engineering applications were found to out-predict the large multiple equation economic models. The development of straightforward computer programs implementing these forecasting techniques allowed for the rapid development of these single equation forecasting models. Numerous economic variables were found to be reasonably predictable using such techniques. These techniques have continued to advance with the development of more complicated techniques (known by acronyms such as "ARCH" and "GARCH"). However, these forecasting techniques are viewed with some suspicion by many economists and forecasters because they lead to models developed using empirical criteria, not models specified as the logical result of economic theory. Even so, single equation forecasting methods are among the most valuable tools used by technical and quantitative market analysts, and are widely applied by Wall Street "Rocket Scientists" and many practicing business forecasters.

Description Paragraph (122):
It is noted that, initially, participants may be uncomfortable clicking on arbitrary areas within a band. Accordingly, an alternate version would be to present users with discrete "buttons" for inputting predictions. Specifically, displayed on the left side of the graph would be the historical trend of recent past values up to the present time in a manner similar to that shown in FIG. 5B. Then, on the remaining right-hand portion of the graph, for each future time horizon, several buttons would be displayed for entering the participant's prediction. The available buttons can be scaled to offer a variety of choices consistent with the measure being considered. Preferably, the buttons would be arranged vertically from the highest value (or change of value) to the lowest value (or change of value) on the screen and would correspond to the time frame shown and indicated on the time axis. Participants preferably still would have the option of providing an exact numerical prediction instead of selecting a button for each prediction. When the predictions for each time frame for each variable have been entered, the participant would click to submit those predictions.

Description Paragraph (130):

Specifically, it may be desirable to permit various display manipulations between when the predictions are "entered" by the participant and when they are "submitted" to the contest. For example, with respect to the Treasury Yield Challenge, the participant might individually estimate the time series of the yield on each instrument, and then obtain a display (a "time series comparison view") that includes superimposed curves corresponding to multiple variable/time-frame combinations (e.g., each in a different color) on a single graph, enabling the participant to view historical and forecast values for multiple variables (e.g., the yields for all five instruments). This is illustrated in FIG. 8, which shows historical data 121 to 125 for the five variables, as well as the current predictions 131 to 135, respectively, for the time frame of interest. Further corrections could be made at this point if the forecast co-movements did not appear correct, such as by returning to the time series view for a single variable and then changing the prediction value(s).

Description Paragraph (131):
In addition to time series views, the participant preferably also has the option to request the cross-section (rotation) of the time series comparison view. With respect to the bond example given above, this view is referred to as the "cross-maturity comparison view", and shows 5 different curves (for the five different prediction time frames) of yield rate plotted against maturity date. Accordingly, this view provides another check point for making corrections to the participant's predictions.

Description Paragraph (132):
It is also noted that, rather than using the time series comparison view and the cross-section (rotation) of the time series comparison view solely for verification purposes, a participant might also be permitted to enter predictions within those views. Because multiple variables are displayed in the time series comparison view, some means for designating the variable for which a prediction is being entered generally must be provided, such as clicking a radio button corresponding to the variable on the display. One advantage of this technique is that the participant is permitted to display data and enter predictions for different variables on the same graph, thus providing a constant view of data for interrelated variables.

Description Paragraph (133):
As a further alternative to the above technique, the participant might initially forecast values within the cross-section (rotation) of the time series comparison view (e.g., in the same manner described above for entering predictions in the time series comparison view) and then request that the data be re-formatted into the time series comparison view for validation and/or corrections. Upon receipt of such a request, the Workbench automatically would generate the time series comparison view.

Description Paragraph (134):
In a still further embodiment, the participant has the option of entering and/or modifying predictions in either the time series comparison view or the cross-section (rotation) of the time series comparison view and then switching back and forth between the different views. By iteratively fine tuning in each view, and then having the Workbench transform the data into the other view, the participant often will be better able to produce and submit forecasts that are more consistent with her actual expectations. In general terms, each of the different views can be provided either for reference purposes only or for both reference and prediction input, depending upon the specific embodiment of the invention.

Description Paragraph (135):
Challenges that flow from the yield curve can be handled in a similar manner. In terms of the risk spread, prediction using the time series view can be repeated with an Aaa series imposed or, at the user's option, the difference may be graphed (e.g., 1 year Aaa yield-1 year treasury yield). Beyond that point, it may be more

useful to graph the spreads (e.g., to avoid ten lines on a graph). The time series of the spreads at different maturities would be presented in a style similar to the "time series comparison view", and the future term structure of spreads in a style similar to the "cross-maturity comparison view". The same input modes would apply, and the participant would again have the ability to examine her predictions from different perspectives prior to submitting them.

Description Paragraph (136):
In short, the Workbench preferably can: (1) allow the participant to submit individual time series estimates, aggregate them, and then take the cross section; or (2) allow the participant to submit cross-section estimates, and convert those estimates into aggregated and disaggregated time series.

Description Paragraph (139):
In addition to displaying historical data for one or more variables, participants preferably also have the option of displaying their own previous predictions and/or the previous predictions of other participants. With regard to the latter, other participants' predictions may be displayed, for example, as a time series of the central tendencies of those predictions, together with an indication of the dispersion measure for those predictions at each point in time.

Description Paragraph (143):
The following describes a representative example of graphical input according to the preferred embodiment of the invention. First, the participant selects the Interest Rate challenge as the challenge in which she wishes to participate. Next, the participant selects a view. Seven possible views exist, two summary views and five different forecast entry tool views. The summary views include the "time series comparison view", and the "cross-maturity comparison view". The five forecast tool views are for forecasting 3 month and 1 year treasury bill yields, 5 and 10 year notes, and 30 year bond yields and are similar to FIG. 5B. By selecting the 1 year t-bill forecast, a graph will be displayed with that variable's realized (historical) values displayed on the left and five bands displayed on the right corresponding to each of the forecasting horizons (e.g. end of next week (ENW), 4 weeks from ENW, 13 weeks from ENW, 52 weeks from ENW, and end of year (EOY)).

Description Paragraph (187):
The Journal Room preferably contains fully referenced academic journals distributed electronically and sponsored by the contest staff members. The following are examples of items which may be included in the Journal Room: a Journal that primarily discusses practitioner oriented investment strategies and forecasting using consensus forecast data; Letters that include shorter practitioner oriented articles including methodology, empirical results, and new models with application to practical forecasting and investing; a Journal of Computation, Economics, and Statistics--an outlet for serious methodological and empirical research utilizing consensus forecasting data; and Transactions--an outlet for serious academic research which has had difficulty being published in other outlets primarily because of "taste trends" in academia. The foregoing items may be published by the contest staff members and include editorial boards whose members are Soapbox Proprietors and recognized scholars. All accepted contributions preferably are fully indexed.

Description Paragraph (359):
Additional features of the invention include: also displaying on the same graph historical values for other variables; providing the ability to display the historical data and/or the predicted value for the prediction variable with respect to a different independent variable than in the initial graph; displaying multiple variables on an initial graph in a first view (e.g., a time series view) and then permitting the participant to obtain a view that is a rotation of the first view (e.g., a cross-maturity comparison view); permitting the participant to numerically alter the prediction after it has been entered graphically; permitting the

participant to alternatively bypass the graphical input altogether and instead enter the prediction numerically; permitting the participant to enter, in addition to his prediction, an estimate of his own uncertainty regarding his prediction; permitting the participant to graph only certain ranges specified by the participant; permitting the participant to change scales of the graph; permitting the participant to obtain graphs of arbitrarily requested mathematical transformations of historical and/or prediction data; permitting the participant to alter his predictions based on any of the foregoing different views, and even from within any or all of the different views; linking historical and/or current data, news, publications, etc. to the cursor position as it moves across the graph, so that such information is easily and conveniently available to the participant; and, lastly, matching the participant's prediction(s) to different prediction models to find the closest model, and thereafter providing the participant with information regarding the model, such as the type of model, the implied assumptions in the participant's prediction(s), and the amount of weight the participant is implicitly applying to different items or pieces of information that underlie the identified forecasting model.

Description Paragraph (393):
In addition to estimation of commodity spot and futures prices, the above techniques can also be used in connection with crop forecasting. Going farther afield, forecasting of consumer and/or societal trends, such as popularity of different colors (for cars, appliances, etc.) or individual movies also can be forecast in a manner which could be improved by the inventive methods described above.

Issued US Cross Reference Classification (1):
705/35

Field of Search Class/SubClass (1):
705/35

US Reference Classification (2):
705/35

US Reference Classification (9):
705/35

US Reference Classification (10):
705/35

US Reference Classification (12):
705/35

US Reference Classification (15):
705/35

US Reference Group (2):
US 5761442 A 19980600 Barr et al. 705/35 cited by examiner

US Reference Group (9):
US 6092056 A 20000700 Tull et al. 705/35 cited by examiner

US Reference Group (10):
US 6275814 B1 20010800 Giansante et al. 705/35 cited by examiner

US Reference Group (12):
US 6317726 B1 20011100 O'Shaughnessy 705/35 cited by examiner

US Reference Group (15):

L9: Entry 1 of 62 File: USPT Jul 17, 2007

DOCUMENT-IDENTIFIER: US 7246090 B1
TITLE: Method for detecting aberrant behavior of a financial instrument

Application Filing Date (1):
20001025

Brief Summary Text (5):
Investors have long sought methods of predicting or anticipating changes in the price of a financial instrument, such as a stock or bond, by attempting to detect changes and trends in the past behavior of the instrument. Many methods have been proposed for doing so.

Brief Summary Text (13):
The method of the present invention compares the value of the three components of behavior of the instruments with the average of those components during a series of time periods. The lengths of the time period may range from relatively short (five days) to relatively long (several years or longer). Each time period ends with the trading session immediately preceding the most recent trading session. When a component of the behavior of the instrument in its most recent trading session differs from the average for that component in a particular time period by more than a selected amount (which is in turn determined by multiplying the standard deviation of the component over the time period by a selected constant), then an "aberration flag" is raised and a degree of aberration is calculated. The degree of aberration indicates the magnitude (in percentage) of the difference between the actual behavior of the component and its expected behavior based on the average over the particular time period. The degrees of aberration for all components based on a single time period are combined by summing the absolute value of the degree of aberration for the price component with a positive degree of aberration for the volume and number of transaction components. The time period degrees of aberration are summed and scaled by the ratio of the number of aberrant flags to the maximum possible number of aberrant flags to provide a total degree of aberration for the instrument on it most recent trading day.

Description Paragraph (11):
Method 100 commences in step 102, in which a plurality of time periods 40 are selected. The behavior of instrument 30 during each of these time periods 40, immediately prior to the current day, is used in method 100. These time periods will preferably include some relatively short time periods (i.e. 2-10 days) and some relatively long periods (i.e. longer than 1 year1). Each time period 40 includes a series of consecutive trading sessions, and each time period 40 ends with the trading session preceding the most recent trading session of instrument 30. For example, if a particular period is 1 year and the most recent trading session of instrument 30 took place on Sep. 9, 2000, then the 1 year time period would run from Sep. 9, 1999 to Sep. 8, 2000 and will include all trading sessions on and between those dates.

Issued US Cross Reference Classification (1):
705/35

L9: Entry 5 of 62 File: USPT Feb 13, 2007

DOCUMENT-IDENTIFIER: US 7177834 B1
TITLE: Machine-implementable project finance analysis and negotiating tool software, method and system

Abstract Text (1):
A financial simulation computer program product and method to create a project preparation, negotiating, and testing environment using standard project finance tools. A computer usable medium having computer-readable program code is embodied in a medium for generating financial statements, financial data, charts, graphs and reports using the standard project finance tools. The product and method allow automatically generated or manual entry of and editing of capital expenditure time series for multiple contracts in multiple capital expenditure categories. Limited recourse including debt service reserve accounts, stand-by loans and risk-sharing with suppliers and off-takers is taken into account. A desired financing time horizon is selected for each loan. For each loan the user can either manually enter disbursements or select a capital expenditure category and finance a percentage of the category. A loan disbursement time series is automatically generated. A loan disbursement times series is optionally generated independently of changes in capital expenditures and exchange rates based upon an earlier automatically generated loan disbursement time series.

Application Filing Date (1):
20000929

Brief Summary Text (13):
The Project Finance Analysis and Negotiating Tool (PFANT) can use a graphical user interface (GUI) to automate the spreadsheet program. The PFANT generates, inter alia, a cash flow, income statement and a balance sheet using standard project finance tools. The PFANT further allows the user to: specify up to three products with a linear production function which, like other hereinbelow mentioned items, is scaleable as computing power increases. create up to eleven currencies project currencies) and attach these currencies to loans, products or inputs; simulate currency shocks and volatility and take care of foreign exchange gains or losses; enter up to sixty capital expenditure (CAPEX) contracts in any project currency; loan-finance up to 100% of any CAPEX contract, a sub-element of the contract or a group of contracts (e.g., all equipment contracts) for a freely definable time period (first to last disbursement month) and to capitalize up to 100% of interest thereon during the time period starting with the first disbursement month until the last interest capitalization month where the latter can be any month up to and including the first loan repayment month; design manually disbursement plans; repay in equal installments, as an annuity or by a manually designed repayment plan, including combining equal installments with the sweep; set up stand-by loans for the construction and loan repayment phase; design an equity subscription plan while ensuring that the DSRAs are always at their required balances and a target equity ratio is met; automatically depreciate capital expenditure linearly and to automatically reinvest; enter overheads in any project currency; enter up to fourteen fixed operating cost items (scaleable) per product in any project currency and to establish a price trend for each fixed operating cost item; enter up to fourteen variable input items per product and establish price trends and/or price volatility for each variable input item; share risks through the variation of the

input price according to the output sales price (two input factors per product--scalable) subject to a freely selectable minimum input price (for which a price trend can be established) and through the deferral-credits of input payments if the sales price goes below a trigger price and the company faces cash flow problems; use three sales methods: (1) sales through off-takers, (2) direct sales, and (3) mark up sales. In case of off-take sales (up to three contracts per product) risk sharing is possible through a handling and/or flat fee deferral-credit mechanism if sales prices fall below a freely selectable trigger price and the company faces cash flow problems; present the cash flow, the income statement and the balance sheet on a monthly, quarterly, semi-annual and annual basis with the usual ratios; and freely set the fiscal year.

Description Paragraph (26):
TABLE-US-00001 TABLE I Data Optional - Required Default Impact of Default NAME, SCHEDULE AND TECHNICAL SPECS. Basic Project Data Project Name Required Name of None Project Project Start Month Required January Project start January Project Start Year Required 2000 Project starts in 2000 End of Project Required 73 Analysis ends in project month 73 Start of Fiscal Year Required January FY starts in January Start up of Operations Required 4 Project starts to produce in Project Month 4 Technical Specifications Product Required Empty No production, no Sales Measurement Unit Output Required Empty Output not specified (tons, kg, pounds etc.) Maximum Capacity p.a. Required One Maximum output one unit per year Actual Capacity Usage - % Required Zero Production zero Capacity use at Start up - % pa Required - exception: Zero No production in start up month Manual Learning curve Learning Period - Month Required One Learning period one month Learning Curve Required None No learning curve. Production starts with actual capacity usage. Time/Unit of Output Required Zero Current asset position work in progress is zero. Underestimation of (Days, hours, minutes, seconds) working capital needs Share Overheads - % Optional Zero No overheads allocated to product. In case of mark up pricing, lower mark up base. Share Depreciation Optional Zero No depreciation allocated to product. In case of mark up pricing lower mark up base. CURRENCIES Numeraire Name of Numeraire Required Numeraire Unit of calculation called numeraire. GDP- Deflator Required Zero No inflation in numeraire. Last Project Month Inflation Required One Inflation ends in project month one Additional Currencies - Optional Additional Currency Optional Empty Only numeraire available. Exchange Rate Required with Add. Empty Model does not allow you to enter additional currency into case Currency file. Exchange Rate trend - % p.a. Optional Zero Exchange rate constant Last Month of Exchange Rate Optional One Exchange rate trend ends in project month one. Trend % - Currency Swings Optional Zero Exchange rate is stable. No volatility. Months - Length of Currency Optional Sixty Frequency of currency cycle (up and down of exchange rate) is 12 Cycle months. Start of Currency Cycle Required Half At project start additional currency is at long term trend exchange Depreciated rate. Price of numeraire goes up. One Time Devaluation (+) - Optional Zero No one time currency shock. Appreciation (-) Month of One time Exchange Required One Currency shock, if any, in project month one. Rate Change CAPITAL EXPENDITURE (CAPEX) Site, Buildings, Equipment, Pre-Production Costs Site, Buildings, Equipment, Optional Empty No capital expenditure in the respective category Pre-Production Currencies Import-Local Required with capex Numeraire Numeraire is currency of respective capex contract. Content Customs - % Required with capex Zero No customs on capex import content Month of First Payment Required with capex One First disbursement in project month one Month of Last Payment Required with capex One Last disbursement in project month one Manual Entry Optional Manual You have to enter manually capex during disbursement period. If you make no entries, capex is zero. Automatic Entry Optional Manual You have to tell the program the total contract amount, the percentage of down and final payment. Total Contract Amount Required with automatic Zero Capex zero entry % - Down Payment Optional Zero Capex in first disbursement month zero % Final Payment Optional Zero Capex in last disbursement month zero LOANS Bank Loans Loan Page One Loan (name) Optional Empty No loan Loan Currency Required with loan Numeraire Numeraire is loan currency. Interest p.a. - % Optional Zero No interest payments

Interest Calculation Required with loan Standard Year has 365 days. Method No. of Months interest Required with loan Six Interest - if any - paid six month in arrears. paid in Arrears % of Interest Capitalized Optional Zero No interest capitalized. Management Fee - % Optional Zero No management fee Arrangement Fee - % Optional Zero No arrangement fee Commitment Fee % Optional Zero No commitment fee No. of Months Required with loan Three Commitment fee is paid three months in arrears. Commitment Fee is paid in Arrears Disbursement Phase - Optional Zero No DSRA during disbursement phase DSRA as % of next Debt Service Repayment Phase - Optional Zero No DSRA during repayment phase DSRA as % of next Debt Service Interest on DSRA - % p.a. Optional Zero No interest on DSRA Monthly Step ups Optional Checked Model calculates monthly step ups for DSRA Loan Page Two Financing Capex Type Optional Total CAPEX Loan finances percentage of total capex. Capex Category Required with loan Total Loan finances % of total expenditure under the contract. Expenditure % of Payment Required with loan if 100% Loan finances 100% of disbursements of a Capex Type and financing is not Manual Capex Category in a selected time period (see below) Manual Optional Not checked No access to manual disbursement schedule Disbursement Schedule Month of Loan Required with loan One Loan effective in month one Effectiveness First Disbursement Month Required with loan One First disbursement possible in project month one Last Disbursement Month Required with loan One Last disbursement possible in project month one Repayment Repayment (Method) Required with loan Equal Loan repaid in equal installments installments Sweep Optional with equal Toggle not No sweep installments pressed Last Month Capitalization Required with loan One Last capitalization of interest possible in project month one of Interest Month - Start Repayment Required with loan Two Repayment phase starts in project month two. Phase First Repayment Month Required with loan Three First repayment in project month three No of Installments Required with loan One Loan is fully repaid in the first repayment month. STAND BY LOANS, SWEEP Stand by Loans Maximum Amount Optional Zero No stand by loan during construction phase (Construction Phase) Interest - % p.a. Optional Zero No interest payment Maximum Amount Optional Zero No stand by loan during repayment phase (Repayment Phase) Interest - % p.a. Optional Zero No interest payment Last Disbursement Month Required One No disbursements (only Stand by Repaym.) Sweep % of Cash Flow Optional Zero No sweep Month - Start Sweep Required with sweep One Sweep starts in project month one Month - End Sweep. Required with sweep Two Sweep ends in project month two PAID IN CAPITAL AND DIVIDENDS Paid in Capital Project Month Required with paid in One Equity paid in enters in project month one capital Equity paid in this Month Optional Zero Value of paid in capital this month is zero. No capital paid in this month Dividends % - Dividend Optional Zero No dividend paid Payments (Monthly, Required with dividends Quarterly Dividends are paid quarterly Quarterly, Semi-annually, Annually) First Dividend Payment Required with dividends One First dividend payment possible project month one Month Minimize Additional Optional Not Possibly lower balance in the cash account: Shareholder Investment checked Earnings allocated to dividends payable can be higher than the remaining cash flow in a month. You can minimize Additional Shareholder Investment by restricting allocation to dividends payable to the amount of remaining cash flow. TAXES AND SUBSIDIES Subsidies Manual Entry of Optional Not No access to entry field for manual editing/entry Subsidies checked Automatic Entry of Optional Checked Model generates automatically subsidies according to your Subsidies specifications. Start Subsidy Month Required with subsidy One First subsidy - if any - in project month one Last subsidy Month Required with subsidy One Last subsidy - if any, - in project month one Subsidy p.a. Optional Zero No subsidy Corporate Tax Manual Tax Rate Entry Optional Not No access to entry field for manual editing/entry checked Automatic Tax Rate Optional Checked Program generates automatically tax rates according to your Entry specifications % - Tax Rate retained Optional Zero No corporate tax on retained income Income % - Tax Rate disbursed Optional Zero No corporate tax on dividends Income Tax Payment (monthly, Required with tax Monthly Corporate tax is paid monthly quarterly, semi-annually, annually) Tax Holiday - months. Optional Zero No tax holiday % Tax Rate ret. Income Optional Zero Corporate tax on retained income is zero during tax holiday during Holiday % Tax Rate disb. Income Optional Zero Corporate tax on disbursed income is zero during tax holiday

during Holiday Years - Carry forward Optional Zero No carry forward of losses Losses Property Tax Manual Tax Rate Entry Optional Not No access to entry field for manual editing/entry checked Automatic Tax Rate Entry Optional Checked Program generates automatically tax rates according to your specifications % - .Property Rate Optional Zero No property tax Tax Payment (Monthly, Required with tax Monthly Property tax is paid monthly Quarterly, Semi-annually, Annually) Tax Holiday - Months. Optional Zero No tax holiday % Tax Rate during Optional Zero Property tax is zero during tax holiday Holiday DEPRECIATION AND MAINTENANCE Amortization and Depreciation Capex Category Optional Empty No access to entry field for depreciation and reinvestment Reinvestment Optional Checked Access to reinvestment in case of buildings and equipment No Reinvestment Optional Not No access to reinvestment checked

Description Paragraph (27):
Number of Years - Linear Required with depreciation One Capex in the respective category is amortized/depreciated within one Depreciation year after start up Reinvestment - % of Optional Zero No reinvestment Capex First Reinvestment Required with reinvestment One First reinvestment one year after start up Last Reinvestment Required with reinvestment One Last reinvestment one year after start up Months between Required with One Reinvestment takes place every month Reinvestments reinvestments Maintenance Maintenance Category Optional Empty No access to entry field for maintenance % - of Capex Optional Checked Maintenance entry as percentage of the capital expenditure in the respective capex category Manual Optional Not You cannot enter an absolute maintenance cost figure checked Maintenance Costs as % of Optional Zero No maintenance costs Capex Equipment Increase - % p.a. Optional Zero Maintenance costs are constant First Month Maintenance Required with maintenance One First cost increase in project month one (cost at project start is Cost Increase cost increase inflated) Last Month Maintenance Required with maintenance One Last cost increase in project month one Cost Increase cost increase GENERAL AND ADMINISTRATIVE COSTS, FIXED OPERATING COSTS General and Administrative Costs, Factory Overheads and Insurance Cost Category Required Administrative Entry Admin. Costs. Click on desired category to switch Costs Currency Required with cost Numeraire Cost in numeraire Cost p.a. at Prices current Optional Zero No cost at Project Start Cost Increase p.a. % Optional Zero No cost-increase First Month Cost Increase Required with cost increase One Cost increase starts in project month one Last Month Cost Increase Required with cost increase One Cost increase ends in project month one Fixed Operating Costs Product Optional Empty No access to fixed operating cost caused by product. No fixed operating costs Name of Fixed Optional Empty No access to fixed operating cost caused by product. No fixed Operating Cost Item operating costs Currency Required with fixed Numeraire Fixed operating cost in numeraire operating costs Cost p.a. at Prices Optional Zero No fixed operating costs Current at Project Start Cost Increase p.a. % Optional Zero No cost increase First Month Cost Required with cost One First cost increase project month one Increase increase Last Month Cost Required with cost Two Last cost increase project month one Increase increase VARIABLE COSTS Variable Cost determined by Input Market Product Optional Empty No access to variable cost caused by product. No variable costs Variable Cost Optional Empty No access to variable cost Unit of Measurement Required with variable Empty You cannot enter variable cost costs Input Output Coefficient Required with variable Empty You cannot enter variable cost costs Minimum Stock - No. of Optional Zero No minimum stock. Working capital lower Input Units Delivery Time 0 < Days < Optional Zero Inventory build up at start up and not before. Lower working capital 91 needs Currency Required with variable Numeraire Variable cost in numeraire costs Price/Unit Input Factor in Required with variable Empty You cannot enter variable cost. selected Currency costs Input Price Trend - % p.a. Optional Zero Price/unit of input constant First Month of Trend Required with variable One Price/unit of input starts to increase in first project month costs Last Month of Trend Required with variable Two Project month two is the last month of price increase/unit of input. costs % - Price Swing Optional Zero No price volatility Months - Length of Cycle Required with price swings Twelve Price goes within twelve months through a complete up and down turn (frequency). Cycle at

Project Start Required with price swings Half Way Price is at long term trend at project start. up Down Payment - % Optional Zero No down payment Avg. Days before Paym. 0 < Optional Zero Payment immediately upon receipts. Working capital higher Days < 91 Flexible Input Pricing Product Optional Empty No access to variable cost Variable Cost Optional Empty No access to variable cost Unit of Measurement Required with variable Empty You cannot enter variable cost. costs Input Output Coefficient Required with variable Empty You cannot enter variable cost. costs Minimum Stock - No. of Optional Zero No minimum stock. Working capital lower Input Units Delivery Time 0 < Days < Optional Zero Inventory build-up at start up. Lower working capital. 91 Trigger Price Deferral Optional Zero Threshold price/unit for deferral zero % deferred Optional Zero No deferral Maximum Amount Optional Zero Deferral - loan is zero. No variable costs are deferred Deferred % - Interest p.a. on Optional Zero No interest on deferral - loan deferred Amount Sales Contract Required with variable cost Manual No Sales Contract as base for input price. Manual entries. Press Edit Entry Market Price and enter market price time series as base. Currency Required with variable Numeraire Variable cost in numeraire costs Cost/Unit as % of Sales Required with variable Zero Variable cost zero Price costs Maximum Price/unit of Optional Zero Cost/unit of input has no upper limit. Output % - Minimum Price Optional Zero Minimum price/unit of input constant Increase p.a. First Month Min. Price Required with minimum One Minimum price/unit of input starts to increase in first project Increase price increase month. Last Month Min. Price Required with minimum Two Project month two is the last month of minimum price increase Increase price increase Down Payment - % Optional Zero No down payment Avg. Days before Paym. Optional Zero Payment immediately upon receipt. Working capital higher 0 < Days < 91 SALES Inventory Cycle Product Optional Empty No access to inventory cycle for product. Inventory cycle zero Average No. of Days Optional Zero No balance sheet position finished goods for product. Lower goods remain in Stock working capital before sold (<= 91, 2 days) Commodity Market Pricing Product Optional Empty No access to off-take sales contract. No sale Contract Optional Empty No off-take sales. Product not sold. Production costs incurred not recovered. Contract Currency Required with off-take Numeraire Numeraire is contract currency. contract Share of Contract in Total Required with off-take Zero No output sold under the contract Sales - % (of the Product) contract Avg. No. of days before Optional Zero Immediate payment. Reduces working capital. Receipt of Payment Automatic Price Optional Checked Program generates sales price time series according to your specifications. Manual Price Optional Not Allows you to edit/enter a sales price time series. checked Price per Unit Optional Zero Sales receipts will be zero or negative (sales expenses). Sales Price Trend % p.a. Optional Zero Sales price constant. First Month of Trend Required with sales price One Trend starts in project month one. trend Last Month of Trend Required with sales price Two Trend ends in project month two. trend % - Price Swings Optional Zero Sales prices don't fluctuate. Months - Length of Cycle Required with price swings Twelve Sales price goes within twelve months through a complete up and down cycle. Cycle at Project Start Required with price swings Half Way Sales price at long term trend at project start. Goes up to top price. up Currency Transport Costs Required with transport Numeraire Transport costs in numeraire Company costs Off-taker Transport Costs/Unit Optional Zero No transport costs Company Off-taker % Cost Increase p.a. Optional Zero Transport cost/unit constant Company Off-taker First Month Transport Required with transport One First transport cost/unit increase in project month one Cost Increase cost/unit increases Company Off-taker Last Month Transport Required with transport Two Last transport cost/unit increase in project month two Cost Increase cost/unit increases Company Off-taker Currency Insurance Required with insurance Numeraire Insurance costs in numeraire Company costs Off-taker Insurance Costs/Unit Optional Zero No insurance costs Company Off-taker % Cost Increase p.a. Optional Zero Insurance cost/unit constant Company Off-taker First Month Insurance Required with insurance One First insurance cost/unit increase in project month one Cost Increase cost/unit increases Company Off-taker Last Month Insurance Required with insurance Two Last insurance cost/unit increase in project month two Cost Increase cost/unit increases Company Off-taker Indirect Tax - % Optional Zero No indirect tax deducted from price paid by end user Duty - %

Optional Zero No duty deducted from gross sales receipts % - Handling Fee Optional Zero No handling fee deducted Flat fee p.a. Optional Zero No flat fee deducted First Month Flat Fee Required with flat fee One Flat fee increased the first time in project month one Increase increase Last Month Flat Fee Required with flat fee Two Flat fee increased the last time in project month one increase. increase % - Handling Fee Optional Zero No handling fee deferred deferred. % Flat Fee deferred. Optional Zero No flat fee deferred Trigger Price Optional Zero Deferral mechanism triggered at prices above zero Max. Deferred Amount Optional Zero No deferral-loan for fees % - Interest on Deferred Optional Zero No interest on deferral-loan Amount Mark up Pricing Product Optional Empty No access to mark up sales contract. No sale

Description Paragraph (52):
An additional currency record consists of the currency name, the exchange rate at project start, an exchange rate array with 254 monthly exchange rates, the first and last exchange rate trend month and information on currency volatility and exchange rate shocks. The exchange rate array over the project lifetime can be generated automatically or manually (or first automatically and then manually edited to save typing). The user can establish depreciation or appreciation trends (up to project month 254). The model uses a sine function to simulate currency volatility. Both the length of a currency cycle (minimum frequency 12 months) and the size of the swings (amplitude <100 percent) around the long-term exchange rate can be freely selected. The user can select among the following options at which point in the cycle the currency should start:

Description Paragraph (67):
Capital expenditure entries can be made either (1) manually for any given month during the construction period until the start up or (2) automatically, in which case the user has to enter the import and local content contract totals, the percentage of the down and final payments. A CAPEX-time series (total amount-down and final payment)/(construction period-2) is calculated. In a planned upgrade an algorithm for typical cost curves will be integrated. The CAPEX data are stored as expenditure time series broken down to the local and import content and customs and possible combinations thereof. The flow chart shown in FIG. 3 describes the steps in this routine triggered by hitting Enter. A utility to make across-the-board CAPEX changes to the import or local content of a contract (e.g. +10%) is provided.

Description Paragraph (141):
Entries fall in two categories: technical and financial. Technical entries comprise the unit of measurement for the input, the input-output coefficient, the minimum (or permanent) stock and the number of days from order to delivery (0<=days<=91,25). The PFANT program automatically builds inventories and orders the minimum stock on time for start up of operations. the user is allowed to freely select any project currency for the input. The only mandatory financial entry besides the currency is the price per unit of input. The user can establish an input price trend (increase or decrease), and select the first and last month of such a trend. She can simulate input price volatility, set the length of the price cycle and determine the status of the input price at project start

Description Paragraph (148):
The technical entries are identical to Type 1. The PFANT program allows the user to (1) select an off-take (sales)--contract or (2) to manually enter a market price scenario (e.g. if a market study is at hand) to serve as price base. A convenient combination of both is to first use an off-take sales contract and then edit manually the sales price time series as necessary. The financial data subset comprise the cost/unit of input as % of the sales price. For example, if the output sales price is 100 currency units per unit of output and the user wants the price of the input/unit be 50% of that price, the user writes 50 into the entry box. The model prices the input factor always at 50% of the sales price of the user's

output--as long as the price is higher than a possibly stipulated minimum price. The user is allowed to enter a minimum price (usually contractually agreed). This minimum price can be inflated. The user can freely select the first and last month of the minimum price increase.

Description Paragraph (152):
The user selects/enters a fixed operating cost item (up to 14 per product) by calling up the product name and then writing/selecting the name of the fixed operating cost item. The user can choose any project currency as cost currency. Costs are entered on a per-year basis and then converted into monthly cost. The user can establish a cost per year in- or decrease trend, and start and end this trend at any time.

Description Paragraph (154):
Maintenance costs that cannot be allocated directly to a product as fixed operating costs (see above) can be entered (1) either as percent of the capital expenditure under the respective capital expenditure-category during the construction period or (2) as an absolute figure. Whatever method is chosen, maintenance is calculated in units of numeraire. The user can establish a maintenance-cost trend and set the first and last month of the trend.

Description Paragraph (156):
The PFANT program recognizes besides maintenance costs which cannot be directly allocated to a product, three further overhead categories: Administrative overheads, factory overheads and insurance. For each category, the user can select any Project Currency and enter the overheads p.a. The yearly cost is divided by twelve to get the monthly overheads. Overheads are taken into account from start up of operations onwards. The user can establish a cost trend and freely set the first and last month of the trend.

Description Paragraph (173):
The PFANT program features two methods to enter the sales prices: automatic or manual. A sales price time series can be automatically generated and then edited as necessary. The manual entry allows data entry as obtained, e.g. from a market study.

Description Paragraph (174):
If the user opts for automatic sales price entries, she can establish a price trend and freely select the first and last trend month. The user is allowed to generate sales price fluctuations around the long-term price trend. Such fluctuations can be generated regardless whether the sales prices have been generated automatically or manually. The program uses a sine function to simulate sales price volatility. Both the length of a price cycle and the amplitude of the price swings around the long-term price can be influenced. In case of sales price volatility, the user can set the price at project start as

Description Paragraph (182):
The user can choose any Project Currency as transport cost currency. She can enter the transport cost per unit and establish a transport cost increase trend. The user is allowed to select the first and last trend month. The same applies ceteris paribus to insurance costs.

Description Paragraph (185):
Usually the off-taker receives a handling fee (a percentage of the sales receipts) for her services. Sometimes a flat fee is negotiated. The PFANT program allows the user to model such fees. Both fees are deducted from the payments to the project-company. The annual flat fee is converted into monthly payments. The user can set a flat fee cost trend.

Description Paragraph (194):

The PFANT program allows Total Operating Costs, Variable Costs, Fixed Operating Costs or Variable+Fixed Operating Costs as mark up basis. Adjustment is made for the share of the contract in total sales. The user can set the mark up percent. The program multiplies the mark up basis with the mark up percent. Parties might agree to a flat payment per annum, like, e.g., a connection fee. The user can establish a flat payment increase trend and select the first and last trend month.

Description Paragraph (337):
Sensitivity Testing: Currency Trends and Currency Fluctuations

Description Paragraph (338):
PROFINTOOLS PROJECT FINANCE gives you various options to simulate exchange rate trends, shocks or fluctuations:

Description Paragraph (339):
Exchange Rate Trend--Percent per Year

Description Paragraph (340):
For depreciation enter positive number. Example: Assume the exchange rate is 10 units of the additional currency for one unit of the numeraire at project start. You expect that you will have to pay 12 units of the additional currency at the end of project year 1 for one unit of the numeraire. The additional currency will have depreciated by 20%. Enter 20 in the Exchange rate Trend p.a. % box.

Description Paragraph (342):
Last Month of Exchange Rate Trend

Description Paragraph (343):
Select the last month of the exchange rate trend with the spinbutton. ProFintools allows you to establish a trend for up to 254 months. The default value is one month.

Description Paragraph (359):
Checklist: Simulate an Exchange Rate Trend

Description Paragraph (360):
1. Select the currency. 2. Write the annual depreciation (+) or appreciation (-) into the exchange rate trend box. 3. Select the last month of the exchange rate trend with the spinbutton. 4. Press Enter. Checklist: Simulate Exchange Rate Volatility 1. Select the currency. 2. Write the percentage of the currency swings (appreciation and depreciation) into the %--Currency Swings box. 3. Select the length of the currency cycle with the spinbutton. 4. Select the status of the currency cycle at project start. 5. Press Enter. Checklist: Simulate a One-Time Exchange Rate Shock. 1. Select the currency. 2. Select the month of the exchange rate shock. 3. Write the percentage of the depreciation (+) or appreciation (-) into the One time Devaluation (+)--Appreciation (-) box. 4. Press Enter. Checklist: Look at or Publish the Exchange Rate 1. After you have entered a currency (steps above) exit Currencies. 2. On the menu bar select Model and on the drop down menu Show Me. 3. Press Currencies. A box appears. Click on the currency you want to see. 4. Press Show Me if you want to see the exchange rate and an associated graph. Else, press Publish. Chapter 5 ProFinTools Project Finance--Capital Expenditure

Description Paragraph (455):
1 Select Equity on the general and Paid in Capital and Dividends on the drop down menu 2 Opt alternatively either for (1) Monthly Entry of Paid in Capital for finetuning or (2) Access to Time Series Paid in Capital for a first rough shot. If you have opted for (1) select the project month you want to look at with the spinbutton on the left upper side. The program shows you the equity ratio, the required and actual balances on the debt service reserve account and the additional shareholder investment in the month under consideration. 3 Write the amount of

capital (in units of numeraire) in the equity entry box or entry fields (in case of entry method (2)) and press Enter. This updates the equity ratio. Checklist: Pay in Capital in Kind 1 Select Capex on the general menu. 2 Select the correct Capex-category and enter the capital goods you want to pay in kind as a Capex contract as described in Chapter 5. 3 Exit Capex and select on the general menu bar Equity 4 Select Paid in Capital and Dividends. 5 Select with the spinbutton on the left upper side, the months in which you have paid in capital in kind. Write for each month you pay in capital in kind, the value of the capital paid in kind in units of numeraire.

Description Paragraph (502):
Input Unit Price Trend

Description Paragraph (503):
If the unit price of the input factor increases, enter a positive number. E.g. if the price per unit rises 10% per year, enter 10 in the Input Unit Price Trend--% p.a. box.

Description Paragraph (505):
First Month of Trend

Description Paragraph (506):
Select the First Month of Trend. PROFINTOOLS PROJECT FINANCE allows you to start the trend at any project month lower than month 254. The default setting is 1 month.

Description Paragraph (507):
Last Month of Trend

Description Paragraph (508):
Select the Last Month of Trend. The program allows you to end the trend at any project month lower than month 254. The default setting is month two.

Description Paragraph (510):
Enter the percentage you want your input factor price to go up and down around the long-run price trend. This entry determines the amplitude of the price swings. E.g. if you want you're the price of your input factor to go up by and down by 20% during a price cycle enter 20.

Description Paragraph (519):
1 Select Variable Costs on the general menu bar. Click on Variable Costs determined by prices on Input Market. The program loads the form. 2 Select the product. 3 Write/select the name of the input factor into the Variable Cost box 4 Write the unit of measurement 5 Write the input output coefficient (number of units of input factor to produce one unit of output) into the Input Output Coefficient box 6 Write the number of units of the input factor to be held as iron stock into respective box or leave the default value 7 Write the delivery time into the respective box or accept the default value zero. 8 Select the contract currency (click, selection should turn blue). 9 Write Price/Unit of Input Factor in the selected currency into the respective box Optional--in case you want to establish a price trend or do sensitivity testing 10 Write price trend per annum (p.a.) into the Input Unit Price Trend--% p.a. box. 11 Select the First Month of Trend and the Last Month of Trend. 12 Write the price volatility into the %--Price Swings box. 13 Select the cycle length. 14 Select the cycle status at project start--price half way up, top Price, half way down, bottom Price (click, selection should turn blue). 15 Press Enter Checklist: Look at or Publish Variable Costs 1 Perform steps 1 15 above. 2 Exit Variable Costs 3 Select Model on the general menu bar. 4 Press the button Cost of Goods, select the product and then the input cost factor you want to study or publish. The model shows you the input cost and an associated graph. Checklist: Delete Variable Costs 1 Select product and then the variable cost input factor. 2

Press Delete. Variable Costs--Prices Determined by Sales Receipts

Description Paragraph (559):
1 Select Variable Costs on the general menu 2 Click on Variable Costs determined by Commodity Markets The model loads the entry form. 3 Select the product. If you have not yet entered your product, go to Global on the general menu bar and then to Name, Schedule and Technical Specs and make the necessary entries. 4 Write the name of the input factor into the Variable Cost box 5 Write the unit of measurement 6 Write the input output coefficient (number of units of input factor necessary to produce one unit of output) into the Input Output Coefficient box 7 Write the number of units of the input factor to be held as iron stock into the respective box or leave the default value 8 Write the delivery time into the respective box or accept the default value 9 Select the off-take contract that will serve as a price base (click, selection should turn blue) or select manual entry. In case of manual entry select the contract currency. 10 Write the price of the input factor as percentage of the sales price per unit into the Cost/Unit as % of Sales Price entry Box. 11 Write the Minimum Price/Unit into the respective Box. 12 Write the increase per year of the minimum price into the respective box. Press Enter or continue with optional entries: Checklist: Optional--If You want to Establish a Price Trend or do Sensitivity Testing 13 Write the maximum deferral--credit amount into the respective box (contract currency) 14 Write the Trigger Price Deferral into the entry box 15 Press Enter--you are done. Checklist: Look at or Publish Variable Costs 1 Perform Steps 1 15 above. 2 Exit Variable Costs 3 Go to Model and then to Show Me. 4 Select Costs of Goods 5 Select the product and then the input you want to review or publish. Press Publish or Show Me. The model shows you the input costs and associated graphs. Checklist: Delete Variable Costs 1 Select the product and then the variable cost input factor. 2 Press Delete. Chapter 11 ProFinTools Project Finance--Fixed Costs Fixed Operating Costs, Maintenance and Overheads

Description Paragraph (570):
For fixed operating cost increases enter a positive number. E.g. if the cost per year rises 10% per year, enter 10 in the Cost Increase p.a.--% box. The model breaks down the 10% increase into monthly increases and make cost adjustments over the year. E.g. if your cost are 1000 currency units per year and you have a price trend of plus 10% per year, the model divides the yearly cost by 12 and inflates the monthly cost by a Monthly Inflation factor. If there is no cost increase, leave the default value 0.

Description Paragraph (584):
You can establish a maintenance cost trend. For maintenance cost increases enter a positive number. E.g. if the cost per year rises 10% per year, enter 10 in the Increase p.a. box. PROFINTOOLS PROJECT FINANCE breaks down the 10% increase into monthly increases and make cost adjustments over the year. E.g. if your cost are 1000 currency units per year and you have a price trend of plus 10% per year, the model divides the yearly cost by 12 and inflates the monthly cost by a monthly cost inflation factor. If there is no cost increase, leave the default value 0.

Description Paragraph (602):
You can establish a overheads cost trend. For overhead cost increases enter a positive number. E.g. if the cost per year rises 10% per year, enter 10 in the Cost Increase p.a. box. PROFINTOOLS PROJECT FINANCE breaks down the 10% increase into monthly increases and make cost adjustments over the year. E.g. if your cost are 1000 currency units per year and you have a price trend of plus 10% per year, the model will divide the yearly cost by 12 and inflate the monthly cost by a monthly cost inflation factor. If there is no cost increase, leave the default value 0.

Description Paragraph (627):
PROFINTOOLS PROJECT FINANCE provides you with three types of sales contracts: (1) off-take agreements (2) direct sales without intermediary based on commodity prices determined in the output market. We will call this type of price mechanism

commodity market pricing. (3) Mark up or cost plus contracts, which determine output prices as a function of the firm's production cost. This chapter deals with contract types (1) and (2)--direct sales or sales through up to three off-take agreements for each product. PROFINTOOLS PROJECT FINANCE provides you with the tools to model common sales expenses on the side of the off-taker and/or the project-company. It allows you to establish price trends and to undertake sensitivity testing. You can use a deferral mechanism for fees to be paid to the off-taker. All this is optional. The chapter starts with a review of the inventory cycle.

Description Paragraph (658):
Sales Price Trend

Description Paragraph (659):
For price increases enter a positive number. E.g. if the price per unit of sold output rises 10% per year, enter 10 in the Sales Price Trend box.

Description Paragraph (661):
First and Last Trend Month

Description Paragraph (662):
Select the first and last price increase month. PROFINTOOLS PROJECT FINANCE allows you to start or end the trend at any project month.

Description Paragraph (666):
The model allows you to generated fluctuations around the long-term price trend. You can generate such fluctuations regardless whether you have generated the sales prices automatically or manually.

Description Paragraph (670):
Enter the percentage you want your sales price to go up and down around the long-term trend. This entry determines the amplitude of the price swings. E.g. if you want the sales price to go up by and down by 20% during a price cycle enter 20.

Description Paragraph (685):
You can start or end your transport cost trend at any month during the project life.

Description Paragraph (694):
You can start or end your insurance cost trend at any month during the project life.

Description Paragraph (723):
1 Select Sales on the general menu. 2 Click on Sales Commodity Market Pricing. The program loads the form. 3 Select the product that you want to sell. 4 Write the name of the off-take contract into the Contract box 5 Select the contract currency (selection should turn blue). 6 Select the price generating method--automatic price or manual. 7 Write the price per unit by the end user (net of VAT) 8 Write the average days before payment into the respective box. Checklist: Optional--If You want to Establish a Price Trend or do Sensitivity Testing 9 Write the sales price trend into the Sales Price Trend %--p.a. box 10 Select first and last trend month. 11 Write price volatility into the % Price Swings box. 12 Select the length of the cycle with the Month--Length of Cycle spinbutton. 13 Select status of the price cycle at project start (Price half way up, Top Price, half way down, Bottom Price--click, selection should turn blue). 14 Enter the indirect tax rate into the Indirect Tax--% box. 15 Enter the duty into the Duty % field. 16 Press Enter if there are no sales expenses. Checklist: Optional--Sales Expenses Off-Taker 17 Select the transport cost currency (click, selection should turn blue). 18 Write the off-taker's transport cost per unit. 19 Write the transport cost increase percent per year--if any. 20 Select the insurance cost currency. 21 Write the

insurance cost per unit--if any. 22 Write the insurance cost increase percent per year Checklist: Optional--Handling Fee and Flat Fee 23 Write the handling fee into the %--Handling Fee box (see Sales Page Two). 24 Write the flat fee into the % Flat Fee p.a. box. 25 Select the first and last flat fee increase month. Checklist: Optional--Deferral--Credit Mechanism 26 Write the Maximum Deferral Amount 27 Write deferral Trigger Price 28 Write the percentage of the flat fee that you want to be deferred. 29 Write the percentage of the handling fee that you want to be deferred. 30 Write the interest rate p.a. on the deferred amounts. Checklist: Optional--Sales Expenses Project Company 30 Select the transport cost currency (click, selection should turn blue). 31 Write the transport cost per unit. 32 Write the transport cost increase per year. 33 Select the insurance cost currency (click, selection should turn blue). 34 Write the insurance cost per unit. 35 Write insurance cost increase per year. Checklist: Delete Off-Take Contract 1. Select Sales on the general menu. Click on Sales Commodity Market Pricing. The program loads the form. 2. Select the product that you want to sell then press Delete. Checklist: Look at or Publish Off-Take Contracts 1 Select Model on the general menu and Show Me on the drop down menu. 2 Press the button Sales then select first the product and then the contract you want to study. The program shows you the contract and associated graphs. 3 For an overview press the button Model. Chapter 14 ProFinTools Project Finance--Sales--Mark Up Pricing

Description Paragraph (751):
First and Last Trend Month

Description Paragraph (752):
Select the first and last flat payment increase month. ProFinTools allows you to start or end the Trend at any project months.

Description Paragraph (792):
The listbox at the bottom gives you access to the 1. Total Cost of Production 2. Total Variable Costs For each month you get access to the total variable cost and the variable cost per unit (in numeraire). The model creates the graphs Total Variable Costs and Total Variable Costs per unit. 3. Total Fixed Operating Costs For each fixed operating cost item a time series of monthly cost. 4. Capacity Use--Learning Curve You find the production capacity (number of units per year) for the product, the capacity use for each project month and the number of units produced. You also find the graphs Capacity use and Monthly Output. Currencies

Description Paragraph (823):
If you click in the Total Recourse combobox on Product Recourse two further comboboxes pop up. Click in the Product combobox on the product that you want to review and select in the third combobox one of the following options: 1. Deferment--Credits Variable cost You get access to the two variable cost input factors that can vary as a function of the sales price of the output. To go to the second variable cost factor move below on the slide bar. The model gives you information on the maximum deferrable amount, the utilization of the deferral--credit, the unused amount. Graphs Deferral Variable cost for each of the two input factors. 2. Unused Recourse Variable Costs Monthly time series on unused variable cost recourse and a Graph total unused conditional reserves available under the variable cost contract arrangements for this product. 3. Deferment Credits Off-take Contracts You find for the three available off-take contracts the monthly data on the deferral of the handling and the flat fee, the maximum deferral amount, the utilization of the deferral credit and the unused amount. You also find a Graph Deferral Flat and Handling Fee (utilization and unused amounts). Move downwards to access off-take contract two and three. 4. Unused Recourse Off-take Contracts Monthly time series on unused off-take cost recourse and a Graph Total unused conditional reserves available under the off-take arrangements. 5. Total unused Product Recourse You find monthly data on the unused recourse. Graph Total Conditional Unused Reserves (according to your selection for product 1, 2 or 3) Sales

Description Paragraph (841):
The sales price you get as break-even price is a sales price at project start. In the break-even month this sales price might differ from the price at project start as you might have established a sales price trend or currency fluctuations. You might also have created a seasonal sales price pattern with the "manual edit" feature.

Description Paragraph (867):
1. How much commodity price volatility can the limited recourse package withstand before the Widget Chemical Company defaults? On the general menu go to Sales. On the drop down menu click on Commodity Market Pricing. Generate sales price increases/decreases or/and fluctuations (see chapter 13) 2. How much exchange rate volatility can the company withstand? On the general menu select Loans. On the drop down menu click on Bank loans. Change the financing method to Manual (this prevents the loan amount to vary with the exchange rate--for details see chapter 6). On the general menu go to Global. On the drop down menu select Currencies. Hit the company with a currency shock, a depreciation trend and/or cyclical exchange rate fluctuations (see chapter 4). E.g. try out a currency volatility of 50%, cycle length 60 months for the Peso and the Pound. 3. How much input price increases can the company withstand? You project a USD-inflation rate of 4% p.a. for the first ten years of the project life. Your USD--fixed operating costs increase by 7% p.a. during that period. Euro input price inflation is 3% p.a. during the first ten years. Select Global on the general and Name, Schedule and Technical Specs on the drop down menu. Enter the GDP-deflator. Select Fixed Costs on the general menu and then General and Administrative Costs, Fixed Operating Costs on the drop down menu. Establish price trends. Select Variable Costs on the general and Costs determined by Input Market on the drop down menu. Establish price trends. Basic Project Data

Description Paragraph (873):
TABLE-US-00015 Additional Currencies Name Peso Yen Euro Pound Exchange Rate 5 105 2.1 0.95 Exchg. Rate Trend 0%. 0%. 0%. 0%. Last Month of Exch. n/a n/a n/a n/a Rate Trend Currency Swings 0% 0% 0% 0% Length of Currency n/a n/a n/a n/a Cycle Start of Currency n/a n/a n/a n/a Cycle One Time n/a n/a n/a n/a App./Depreciation Month of One Time n/a n/a n/a n/a App./Depreciation

Description Paragraph (898):
TABLE-US-00031 Product 1: LDPE GP Film Div. Pressurized Cooling Process Name Buten Octen Solvent Hydrogen Chemcials Electricity Vapor Water Water Unit of n/a n/a Kg kg kg kwh kg cbm Cbm Measurement Input Output n/a n/a 20 0.02 1 600 610 250 0.5 Coeff. Minimum Stock n/a n/a 2000 5000 1000 0 0 0 0 Delivery Time n/a n/a 80 20 45 0 0 0 0 Currency n/a n/a Euro Euro Euro USD USD USD USD Price/Unit of n/a n/a 1.5 0.05 5 0.1 0.01 0.02 0.02 Input Input Price 0% 0% 0% 0% 0% 0% 0% 0% 0% Trend p.a. First Month n/a n/a n/a n/a n/a n/a n/a n/a n/a Trend Last Month n/a n/a n/a n/a n/a n/a n/a n/a n/a Trend % Price Swings n/a n/a 0 0 0 0 0 0 0 Months Length n/a n/a n/a n/a n/a n/a n/a n/a n/a of Cycle Cycle at Project n/a n/a n/a n/a n/a n/a n/a n/a N/a Start Down Payment n/a n/a 15 15 15 0 0 0 0 Avg. Days n/a n/a 60 70 50 30 0 0 0 before Paym.

Description Paragraph (899):
TABLE-US-00032 Product 1: LDPE GP Film - Flexible Input Pricing Name EthylensupplyInc Contr 1 Unit of Measurement tons Input Output Coeff. 1.05 Minimum Stock 1,000 Delivery Time 0 Trigger Price Deferral-USD 450 % deferred 50% Max. Amount deferred 2,000,000 % Interest p.a. on deferred Amount 5% Sales Contract LDPE Contract 1 Currency USD Cost/Unit as % of Sales Price 40% Minimum Price/Unit Input (USD) 300 %- Minimum Price increase p.a. 0% First Month Trend n/a Last Month Trend n/a Down Payment 15 Avg. Days before Paym. 60

Description Paragraph (900):
TABLE-US-00033 Product 2: LLDPE - Butene Div. Pressurized Cooling Process Name Buten Octen Solvent Hydrogen Chemcials Electricity Vapor Water Water Unit of kg n/a

kg kg kg Kwh kg cbm cbm Measurement Input Output 90 n/a 17 0.01 1 540 610 300 0.4 Coeff. Minimum Stock 2000 n/a 2000 2500 1000 0 0 0 0 Delivery Time 30 n/a 80 20 50 0 0 0 0 Currency Pound n/a Euro Euro Euro USD USD USD USD Price/Unit of 1.5 n/a 1.5 0.05 10 0.1 0.01 0.02 0.02 Input Input Price 0% 0% 0% 0% 0% 0% 0% 0% 0% Trend p.a. First Month n/a n/a n/a n/a n/a N/a n/a n/a n/a Trend Last Month n/a n/a n/a n/a n/a N/a n/a n/a n/a Trend % Price Swings n/a n/a 0 0 0 0 0 0 0 0 Months Length n/a n/a n/a n/a n/a n/a n/a n/a n/a n/a of Cycle Cycle at Project n/a n/a n/a n/a n/a n/a n/a n/a n/a n/a Start Down Payment n/a n/a 15 15 15 15 0 0 0 Avg. Days n/a n/a 60 70 50 50 0 0 0 before Paym.

Description Paragraph (901):
TABLE-US-00034 Product 2: Flexible Input Pricing Name EthylensupplyInc Contr 2 Unit of Measurement Tons Input Output Coeff. 1.05 Minimum Stock 1,000 Delivery Time 0 Trigger Price Deferral 3,500 % deferred 50% Max. Amount deferred 4,000,000 % Interest p.a. on deferred Amount 5% Sales Contract LLDPE Butene Contract 2 Currency Peso Cost/Unit as % of Sales Price 40% Minimum Price/Unit Input (Peso) 1800 %- Minimum Price increase p.a. 0% First Month Trend n/a Last Month Trend n/a Down Payment 15 Avg. Days before Paym. 60

Description Paragraph (902):
TABLE-US-00035 Product 3: LLDPE - Octene Div. Pressurized Cooling Process Name Buten Octen Solvent Hydrogen Chemcials Electricity Vapor Water Water Unit of n/a kg kg kg kg Kwh kg cbm cbm Measurement Input Output n/a 85 22 0.03 1 580 640 300 0.4 Coeff. Minimum Stock n/a 2000 2000 2500 1000 0 0 0 0 Delivery Time n/a 40 80 20 50 0 0 0 0 Currency n/a Euro Euro Euro Euro USD USD USD USD Price/Unit of n/a 75 1.5 0.05 12 0.1 0.01 0.02 0.02 Input Input Price 0% 0% 0% 0% 0% 0% 0% 0% 0% Trend p.a. First Month n/a n/a n/a n/a n/a n/a n/a n/a n/a Trend Last Month n/a n/a n/a n/a n/a n/a n/a n/a n/a Trend % Price Swings n/a n/a 0 0 0 0 0 0 0 0 Months Length n/a n/a n/a n/a n/a n/a n/a n/a n/a n/a of Cycle Cycle at Project n/a n/a n/a n/a n/a n/a n/a n/a n/a n/a Start Down Payment n/a 15 15 15 15 15 0 0 0 Avg. Days n/a 60 60 70 50 50 0 0 0 before Paym.

Description Paragraph (903):
TABLE-US-00036 Product 3: Flexible Input Pricing Name EthanGasVendor Unit of Measurement Tons Input Output Coeff. 1.08 Minimum Stock 1,000 Delivery Time 0 Trigger Price Deferral 1,500 % deferred 50% Max. Amount deferred 2,000,000 % Interest p.a. on deferred Amount 5% Sales Contract LLDPE Octene Contract 2 Currency Peso Cost/Unit as % of Sales Price 25% Minimum Price/Unit Input (Peso) ? %- Minimum Price increase p.a. 0% First Month Trend n/a Last Month Trend n/a Down Payment 15 Avg. Days before Paym. 60

Description Paragraph (905):
TABLE-US-00037 Product 1: LDPE GP Film Offtake Contract Data Product LDPE GP Film LDPE GP Film Contract LDPE GP Film LDPE GP Film Contract 1 Contract 2 Contract Currency USD Pound Share of Contract 50% 50% Avg. No. Days before 60 30 Receipt of Payment Automatic Price TRUE TRUE Price per Unit 2,300 2,400 Sales Price Trend p.a. 0% 0% First Month Trend n/a n/a Last Month Trend n/a n/a % Price Swings 0% 0% Months-Length of Cycle n/a n/a Cycle at Project Start n/a n/a Sales Expenses Company Currency Transport Cost USD USD Transport Cost/Unit 60 60 % Cost Increase p.a. 0% 0% First Month Transport Cost n/a n/a Increase Last Month Transport Cost n/a n/a Increase Currency Insurance USD USD Insurance Cost/Unit 1.5 1.5 % Cost Increase p.a. 0% 0% First Month Insurance Cost n/a n/a Increase Last Month Insurance Cost n/a n/a Increase Sales Expenses Off-Taker Currency Transport Cost Peso Pound Transport Cost/Unit 200 20 % Cost Increase p.a. 0% 0% First Month Transport Cost n/a n/a Increase Last Month Transport Cost n/a n/a Increase Currency Insurance Peso Pound Insurance Cost/Unit 100 2 % Cost Increase p.a. 0% 0% First Month Insurance Cost n/a n/a Increase Last Month Insurance Cost n/a n/a Increase Fees Handling Fee - % 5% 5% Flat Fee p.a. 0 0 % Flat Fee Increase p.a. n/a n/a First Month Flat Fee n/a n/a Increase Last Month Flat Fee n/a n/a Increase Taxes and Duty Indirect Tax - % 10% 0% Duty 5% 0% % Handling Fee deferred 50% 50% % Flat

fee deferred 0% 0% Trigger Price USD 2,700 Pound 2750 Max. amount deferred USD 500,000 Pound 500,000 % Interest on deferred 5% 5% Amount

Description Paragraph (906):
TABLE-US-00038 Product 2: LLDPE - Butene Offtake Contract Data Product LLDPE Butene LLDPE Butene Contract LLDPE Butene LLDPE Butene Contract 1 Contract 2 Contract Currency Yen Peso Share of Contract 50% 50% Avg. No. Days before 60 30 Receipt of Payment Automatic Price TRUE TRUE Price per Unit 100,000 8,500 Sales Price Trend p.a. 0% 0% First Month Trend n/a n/a Last Month Trend n/a n/a % Price Swings 0% 0% Months-Length of Cycle n/a n/a Cycle at Project Start n/a n/a Sales Expenses Company Currency Transport Cost USD USD Transport Cost/Unit 60 60 % Cost Increase p.a. 0% 0% First Month Transport Cost n/a n/a Increase Last Month Transport Cost n/a n/a Increase Currency Insurance USD USD Insurance Cost/Unit 1.5 1.5 % Cost Increase p.a. 0% 0% First Month Insurance Cost n/a n/a Increase Last Month Insurance Cost n/a n/a Increase Sales Expenses Off-Taker Currency Transport Cost Yen Peso Transport Cost/Unit 2000 300 % Cost Increase p.a. 0% 0% First Month Transport Cost n/a n/a Increase Last Month Transport Cost n/a n/a Increase Currency Insurance Yen Peso Insurance Cost/Unit 500 50 % Cost Increase p.a. 0% 0% First Month Insurance Cost n/a n/a Increase Last Month Insurance Cost n/a n/a Increase Fees Handling Fee - % 5% 5% Flat Fee p.a. 0% 0% % Flat Fee Increase p.a. n/a n/a First Month Flat Fee n/a n/a Increase Last Month Flat Fee n/a n/a Increase Taxes and Duty Indirect Tax - % 10% 0% Duty 5% 0% % Handling Fee deferred 50% 50% % Flat fee deferred 0% 0% Trigger Price Yen 120,000 Peso 95,000 Max. amount deferred Yen Peso 50,000,000 2,500,000 % Interest on deferred 5% 5% Amount

Description Paragraph (907):
TABLE-US-00039 Product 3: LLDPE - Octene Offtake Contract Data Product LLDPE Octene LLDPE Octene Contract LLDPE Octene LLDPE Octene Contract 1 Contract 2 Contract Currency Peso Pound Share of Contract 40% 60% Avg. No. Days before 60 30 Receipt of Payment Automatic Price TRUE TRUE Price per Unit 8,000 3,000 Sales Price Trend p.a. 0% 0% First Month Trend n/a n/a Last Month Trend n/a n/a % Price Swings 0% 0% Months-Length of Cycle n/a n/a Cycle at Project Start n/a n/a Sales Expenses Company Currency Transport Cost USD USD Transport Cost/Unit 60 60 % Cost Increase p.a. 0% 0% First Month Transport Cost n/a n/a Increase Last Month Transport Cost n/a n/a Increase Currency Insurance USD USD Insurance Cost/Unit 1.5 1.5 % Cost Increase p.a. 0% 0% First Month Insurance Cost n/a n/a Increase Last Month Insurance Cost n/a n/a Increase Sales Expenses Off-Taker Currency Transport Cost Peso Pound Transport Cost/Unit 200 20 % Cost Increase p.a. 0% 0% First Month Transport Cost n/a n/a Increase Last Month Transport Cost n/a n/a Increase Currency Insurance Peso Pound Insurance Cost/Unit 100 2 % Cost Increase p.a. 0% 0% First Month Insurance Cost n/a n/a Increase Last Month Insurance Cost n/a n/a Increase Fees Handling Fee- % 5% 5% Flat Fee p.a. 0 0 % Flat Fee Increase p.a. n/a n/a First Month Flat Fee n/a n/a Increase Last Month Flat Fee n/a n/a Increase Taxes and Duty Indirect Tax- % 10% 0% Duty 5% 0% Deferral % Handling Fee deferred 50% 50% % Flat fee deferred 0% 0% Trigger Price Peso 15,000 Pound 8,000 Max. amount deferred Peso Pound 2,500,000 500,000 % Interest on deferred 5% 5% Amount

Description Paragraph (925):
TABLE-US-00043 Additional Currencies Name Franc Exchange Rate 3 Exchg. Rate Trend 0% Last Month of Exch. Rate Trend n/a Currency Swings 0% Length of Currency Cycle n/a Start of Currency Cycle n/a One Time App./Depreciation n/a Month of One Time App./Depreciation n/a

Description Paragraph (948):
TABLE-US-00057 Product 1: Passenger Cars Name Wayside Cleanups Unit of Measurement Cleanup Input Output Coeff. 0.005 Minimum Stock n/a Delivery Time n/a Currency Franc Price/Unit of Input 300 Input Price Trend p.a. 0% First Month Trend n/a Last Month Trend n/a % Price Swings n/a Months Length of Cycle n/a Cycle at Project Start n/a Down Payment n/a Avg. Days before Paym. n/a

Description Paragraph (949):
TABLE-US-00058 Product 3: Buses Name Wayside cleanup Unit of Measurement Clean up Input Output Coeff. 0.01 Minimum Stock n/a Delivery Time n/a Currency Franc Price/Unit of Input 200 Input Price Trend p.a. 0% First Month Trend n/a Last Month Trend n/a % Price Swings n/a Months Length of Cycle n/a Cycle at Project Start n/a Down Payment n/a Avg. Days before Paym. n/a

Description Paragraph (951):
TABLE-US-00059 Product 1 Passenger Cars Offtake Contract Data Product Passenger Cars Contract Avg. Passenger Tariff Contract Currency Franc Share of Contract 100% Avg. No. Days before Receipt of 0 Payment Automatic Price TRUE Price per Unit 30 Sales Price Trend p.a. 0% First Month Trend n/a Last Month Trend n/a % Price Swings 0% Months - Length of Cycle n/a Cycle at Project Start n/a Sales Expenses Company Currency Transport Cost USD Transport Cost/Unit 0 % Cost Increase p.a. 0% First Month Transport Cost Increase n/a Last Month Transport Cost Increase n/a Currency Insurance USD Insurance Cost/Unit 0 % Cost Increase p.a. 0% First Month Insurance Cost Increase n/a Last Month Insurance Cost Increase n/a Sales Expenses Off-Taker Currency Transport Cost USD Transport Cost/Unit 0 % Cost Increase p.a. 0% First Month Transport Cost Increase n/a Last Month Transport Cost Increase n/a Currency Insurance USD Insurance Cost/Unit 0 % Cost Increase p.a. 0% First Month Insurance Cost Increase n/a Last Month Insurance Cost Increase n/a Fees Handling Fee - % 0% Flat Fee p.a. 0 % Flat Fee Increase p.a. n/a First Month Flat Fee Increase n/a Last Month Flat Fee Increase n/a Taxes and Duty Indirect Tax - % 0% Duty 0% % Handling Fee deferred 0% % Flat fee deferred 0% Trigger Price 0 Max. amount deferred 0 % Interest on deferred Amount 0%

Description Paragraph (952):
TABLE-US-00060 Product 2: Trucks Offtake Contract Data Product Trucks Contract Avg. Truck Tariff Contract Currency Franc Share of Contract 100% Avg. No. Days before Receipt of 0 Payment Automatic Price TRUE Price per Unit 90 Sales Price Trend p.a. 0% First Month Trend n/a Last Month Trend n/a % Price Swings 0% Months - Length of Cycle n/a Cycle at Project Start n/a Sales Expenses Company Currency Transport Cost USD Transport Cost/Unit 0 % Cost Increase p.a. 0% First Month Transport Cost Increase n/a Last Month Transport Cost Increase n/a Currency Insurance USD Insurance Cost/Unit 0 % Cost Increase p.a. 0% First Month Insurance Cost Increase n/a Last Month Insurance Cost Increase n/a Sales Expenses Off-Taker Currency Transport Cost USD Transport Cost/Unit 0 % Cost Increase p.a. 0% First Month Transport Cost Increase n/a Last Month Transport Cost Increase n/a Currency Insurance USD Insurance Cost/Unit 0 % Cost Increase p.a. 0% First Month Insurance Cost Increase n/a Last Month Insurance Cost Increase n/a Fees Handling Fee - % 0% Flat Fee p.a. 0 % Flat Fee Increase p.a. n/a First Month Flat Fee Increase n/a Last Month Flat Fee Increase n/a Taxes and Duty Indirect Tax - % 0% Duty 0% % Handling Fee deferred 0% % Flat fee deferred 0% Trigger Price 0 Max. amount deferred 0 % Interest on deferred Amount 0%

Description Paragraph (953):
TABLE-US-00061 Product 3: Buses Offtake Contract Data Product Buses Contract Avg. Bus Tariff Contract Currency Franc Share of Contract 100% Avg. No. Days before Receipt of 0 Payment Automatic Price TRUE Price per Unit 60 Sales Price Trend p.a. 0% First Month Trend n/a Last Month Trend n/a % Price Swings 0% Months - Length of Cycle n/a Cycle at Project Start n/a Sales Expenses Company Currency Transport Cost USD Transport Cost/Unit 0 % Cost Increase p.a. 0% First Month Transport Cost Increase n/a Last Month Transport Cost Increase n/a Currency Insurance USD Insurance Cost/Unit 0 % Cost Increase p.a. 0% First Month Insurance Cost Increase n/a Last Month Insurance Cost Increase n/a Sales Expenses Off-Taker Currency Transport Cost USD Transport Cost/Unit 0 % Cost Increase p.a. 0% First Month Transport Cost Increase n/a Last Month Transport Cost Increase n/a Currency Insurance USD Insurance Cost/Unit 0 % Cost Increase p.a. 0% First Month Insurance Cost Increase n/a Last Month Insurance Cost Increase n/a Fees Handling Fee - % 0% Flat Fee p.a. 0 % Flat Fee Increase p.a. n/a First Month Flat Fee Increase n/a Last

Month Flat Fee Increase n/a Taxes and Duty Indirect Tax - % 0% Duty 0% % Handling Fee deferred 0% % Flat fee deferred 0% Trigger Price 0 Max. amount deferred 0 % Interest on deferred Amount 0%

Issued US Cross Reference Classification (1):
705/35

Field of Search Class/SubClass (2):
705/35

US Reference Classification (2):
705/35

US Reference Group (2):
US 5704045 A 19971200 King et al. 705/35 cited by examiner

CLAIMS:

1. A method for implementing a machine-readable financial simulation computer program product for creating a project preparation, negotiating and testing environment using project finance tools, comprising: installing the program which is contained as computer readable code on a computer usable medium for generating financial statements, financial data, charts, graphs and reports using the project finance tools providing limited recourse including debt service reserve accounts, stand-by loans and risk sharing with suppliers and off-takers in a computer; entry and editing of data representative of multiple contracts and multiple capital expenditure categories; selecting a desired loan financing time horizon; setting a percentage of a capital expenditure time series to be financed; and generating a loan disbursement time series independent of changes in capital expenditures and exchange rates based on an earlier automatically generated disbursement time series, wherein the capital expenditure categories serve as a basis for loan financing comprise a first category which includes total capital expenditure, site, buildings, equipment and pre-production costs; a second category which includes total expenditure in a category element or sub-elements which include imports, local content, customs, imports and customs, local content and customs, and imports and customs; a third category which is an individual contract; and a fourth category which includes a total expenditure of a contract or sub-elements thereof, including imports, local content, customs, imports and customs, local content and customs, and imports and local content.

2. A method for implementing a machine-readable financial simulation computer program product for creating a project preparation, negotiating and testing environment using project finance tools, comprising: installing the program which is contained as computer readable code on a computer usable medium for generating financial statements, financial data, charts, graphs and reports using the project finance tools providing limited recourse including debt service reserve accounts, stand-by loans and risk sharing with suppliers and off-takers in a computer; entry and editing of data representative of multiple contracts and multiple capital expenditure categories; selecting a desired loan financing time horizon; setting a percentage of a capital expenditure time series to be financed; and generating a loan disbursement time series and independent of changes in capital expenditures and exchange rates based on an earlier automatically generated disbursement time series, further comprising sharing cash flow risks with a supplier including, upon selection of a sales contract and inputting of a percentage to be applied to a sales price of the selected sales contract to obtain input price, establishing a link between the sales contract and the input price and entering the name of the selected sales contract into a variable input record to allow the input price in units of account to vary--subject to a minimum price time series--with the sales price time series and an associated exchange rate time series.

Previous Doc Next Doc Go to Doc#

L8: Entry 9 of 10 File: USPT May 11, 2004

DOCUMENT-IDENTIFIER: US 6735580 B1
TITLE: Artificial neural network based universal time series

Abstract Text (1):
A neural network based universal time series prediction system for financial securities includes a pipelined recurrent ANN architecutre having a plurality of identical modules to first adjust internal weights and biases in response to a first training set representing a nonlinear financial time series of samples of a financial quantity and a target value, and then determine and store an estimated prediction error of the ANN in order to adjust short time stock price predictions in accordance with the stored prediction error. The prediction system is also designed to output upper and lower prediction bounds within a confidence region.

Brief Summary Text (2):
The invention relates to a time series prediction system for financial securities utilizing Artificial Neural Network (ANN). More particularly, the invention relates to a processing system based on the recurrent ANN architecture capable of outputting upper and lower prediction bounds at any given confidence, which is based on the validation errors of the ANN. Specifically, the invention relates a prediction system that can be applied to any financial time series which can be called by any computer language and Web applications supporting the system.

Brief Summary Text (8):
U.S. Pat. No. 5,109,475 to Kosaka et al. discloses a neural network for selection of time series data. This process is illustrated in a particular application to the problem of stock portfolio selection. In the first step of the proposed process, certain characteristics for each security are calculated from time series data related to the security. The characteristics to be computed include the historical risk (variance and co-variance) and the return. The following step involves the establishment of a performance function based on the calculated characteristics and, in the third step of the process, a Hopfield neural network is used to select a subset of securities from a predefined universe. Due to the fact that the Kosaka system only considers historical risk and return data, and implicitly assumes that the relationship between risk and return factors will remain stable in the future, in a typical rapidly changing market environment, it is unlikely to predict accurately price variations which are subject to complicated non-linear relationships.

Brief Summary Text (9):
U.K Pat. application 2 253 081 A to Hatano et al. discloses a neural net for stock selection using only price data as input. The main idea of the proposed system is to calculate runs (sequences) of price trends, increases and decreases, using a point-and-figure chart and using the maximum and minimum values from the chart to make a time-series prediction using a neural network. As in the previous case, the Hatano system only uses historic price data which places limitation on the type and quality of predictions that may be achieved. Additionally, the use of only the external points of the price chart obscures even further information about any time dependencies that might be present in the original data.

Brief Summary Text (10):

The above-described financial systems do not fully utilize the potential of the neural nets for stock selection. Notably missing is the possibility to develop the standard adaptive training procedure of the RNN to determine a prediction error or function in accordance to which the RNN output can be controlled. Further, many of the known investment management systems have not been able to effectively output the upper and lower error bounds at a given confidence level. Further, the movements of the stock prices, as well as price movements of other financial instruments, generally present a deterministic trend superimposed with some "noise" signals, which are, in turn, composed of truly random and chaotic signals, as illustrated in FIG. 1. Deterministic trends can be detected and assessed by some maximum-likelihood processes. Although a truly random signal, often represented by a Brownian motion, is unpredictable, it can be estimated by its mean and standard deviation. The chaotic signal, seemingly random but with deterministic nature, proves predictable to some degree by means of several analysis techniques, among which the ANN techniques have proven most effective over the widest range of predictive variables. However, this trend is largely ignored by the above-discussed references. As a result, at least some of the known systems are fed with data including this deterministic trend that influences the training stage of the known systems. Overall, many of the known systems are limited for the prediction of specific types of securities and data, such as the price of a single stock and, thus, cannot be universally applied to any financial time series, price series and volatility series.

Brief Summary Text (11):
It is, therefore, desirable to provide a prediction system based on the recurrent Artificial Neural Network (ANN) architecture which is able to output upper and lower predictions bounds at any given confidence level. Also, an ANN prediction that can be applied to financial time series, price series and volatility series, for single securities and for portfolios of securities is desirable. A universal prediction system employing a pipeline recurrent neural network (PRNN), which provides the satisfactory accuracy of the nonlinear and adaptive prediction of nonstationary signal and time series processes is also desirable. Further, a universal ANN prediction system having high computation efficiency and multi-stage adaptive supervised training process is also desirable.

Brief Summary Text (17):
In accordance with still another aspect of the invention, the deterministic or expected trend of the chaotic component of a signal representing the evaluated time-series data is determined in accordance with log-linear chisquared linear least squares based on the Black-Scholes stock price formula. The Black-Scholes formula, or other option pricing formula, is used to determine expected option costs in determining necessary hedging and pricing. The Black-Scholes formula provides an option cost based upon index price, exercise price, option term and assumptions of risk free rates of return, average dividend yield, and volatility of returns (standard deviation of returns). The trend is removed before feeding the data to the ANN engine and added back to the data in the post processing stage of the inventive process.

Brief Summary Text (25):
The inventive system has managed to yield prediction refinements well beyond those of other systems by employing a pipelined recurrent ANN architecture (best for time-series prediction) and an adaptive supervised training procedure.

Brief Summary Text (28):
Yet another object of the present invention is to provide a data processing system based on an artificial neural network employing a pipelined recurrent ANN architecture to provide the satisfactory accuracy of the nonlinear and adaptive prediction of time series process.

Drawing Description Text (4):

FIG. 2 is a graphical presentation of a three-line band forecast illustrating a time-series financial security exhibiting a predicted trend within upper and lower boundaries which define a confidence level in accordance with the invention.

Drawing Description Text (5):
FIG. 3 is a basic flow chart generally illustrating a universal time series prediction system for financial securities in accordance with the invention.

Drawing Description Text (6):
FIG. 4 is a flow chart illustrating an ANN engine of the universal time series prediction system shown in FIG. 3 and including a pre- and post-processing system for removing the deterministic trend from the data fed to the ANN engine and adding it to the processed data, respectively.

Drawing Description Text (7):
FIG. 5 is a flow chart illustrating the universal time series prediction system for financial securities shown in FIGS. 2-4.

Drawing Description Text (8):
FIG. 6 is a flow chart illustrating a step-by-step process of training the universal time series prediction system for financial securities shown in FIGS. 2-5 in accordance with the present invention.

Detailed Description Text (2):
Referring to FIGS. 2-6 and particularly to FIG. 2, a three-line band, which graphically presents a universal time series prediction system for financial securities stock price system and enables the online investors to obtain an illustrative understanding of the possible stock price movements. Particularly, price fluctuation of a stock 20 is traced for a period of time until a real time point at which financial time series prediction is outputted at a given confidence level. Specifically, the prediction system is capable of outputting upper 22 and lower 24 prediction bounds of the most likely price movement of a stock 20 which could be predicted within a confidence range W delimited by the upper and lower bounds. The confidence range depends on how well a prediction system is trained, and, in accordance with the invention, can be as high as 80%. This probability indicates that the stock 20 will remain between the lower and upper boundaries within the next few days. In order to obtain such a high probability, an artificial neural network (ANN) prediction system is trained in accordance with the inventive method better illustrated in FIGS. 3-7.

Detailed Description Text (3):
The Neural Network Stock Prediction Engine 30 basically includes a three-step process, comprised of a pre-processing stage 32, training or learning stage 34 and a post-processing stage 36. The pre-processing stage includes software executing on a computer 38 for determination of the deterministic or expected trend of a financial time-series signal 10, which, as mentioned before and illustrated in FIG. 1 is comprised of a truly random component 12 and a chaotic component 14 which has the expected trend. The trend determination relies on certain chi-squared analysis based on Black-Scholes formula well known in the art. Particularly, for predicting prices of a single stock, log-linear chi-squared linear least squares analysis is used. For the prediction of the prices of a portfolio of stocks, linear chi-squared linear least squares analysis is used. For the prediction of other financial quantities, such as volatilities and the prices of other financial securities, the corresponding financial models (e.g., GARCH) are used in the pre-processing analysis. Different pre-processing processes can be selected dynamically at run time.

Detailed Description Text (12):
FIG. 6 illustrates a step-by-step training process of ANN and includes a powerful computer distinguished for its high computational efficiency which allows the ANN

to process any financial time series, price series and volatility series, for single securities and for portfolios of securities.

Detailed Description Text (13):
An adaptive supervised training and prediction process in accordance with the invention includes collecting the training set selected from a stored time series at 70. As disclosed above, the training set includes an input data for the ANN to "see" and the known supervised target data for the ANN to learn to output. After inputting subsequent groups of samples at 72 and 76, the ANN performs adjustment steps 74 and 78, respectively, to adjust its internal parameters so as to bring the ANN's output and the respective known target close to one another. As a consequence, an error function of the ANN is continuously minimized due to a great number of repetitions at 80 and 82. A new set selected from the same data but unknown to the ANN is collected at 84 to be processed in a one-step adaptive training stage. This procedure is similar to the previous one, but in addition to the adjustment of internal parameters, the difference between each output of the ANN and a respective target data is first determined and stored at 86 in order to determine an average prediction error at 88. Finally, all further predictions will be determined in accordance with the one-step stage 90 and automatically adjusted to incorporate the estimated prediction error.

Field of Search Class/SubClass (7):
705/35

Other Reference Publication (1):
Lawrence et al., "Noisy Time Series Prediction Using Symbolic Representation and Recurrent Neural Network Grammatical Inference", 1996, Retrieved from the Internet: http://citeseer.nj.nec.com/lawrence97noisy.html.*

Other Reference Publication (2):
Schwaerzel et al., "Improving the Accuracy of Financial Time Series Prediction Using Ensemble Networks and High Order Statisitcs", Proceedings of the International Conference on Neural Networks, 1997.*

CLAIMS:

1. A computer implemented method of training a recurrent artificial neural network (ANN) for prediction of a response in a time-variable financial series of values comprising the steps of: (a) collecting historical data comprised of a multiplicity of said values; (b) determining an expected trend of the data and removing the expected trend from the data, wherein the expected trend of the data is determined by quantities of particular items to be predicted, trading volume and volatility or spread of quantities with respect to time; (c) feeding a first group of said data to the recurrent ANN in a first training process; (d) adjusting weights and biases of the ANN in response to the first training process; (e) repeating steps (b) and (c) with additional groups of said values; (f) determining an error in successive values from step (d) after said plurality of repetitions, wherein the ANN error represents the difference between each ANN output and a respective target sample; (g) averaging said error over a plurality of the values; (h) selecting a particular item for which a prediction of a response is desired; (i) adjusting an output of ANN for the particular item with the determined average error; and (j) outputting upper and lower error bounds of the adjusted output defining therebetween a probability range within which the adjusted output is predicted to remain for a period of time without fluctuating beyond the upper and lower error bounds.

5. A computer implemented method of predicting the future behavior of a financial time series comprising the steps of: (a) collecting a first set representing a nonlinear financial time series of subsequent samples of a financial quantity combined in a plurality of groups, wherein the first sample of a subsequent group is a target sample of the previous group; (b) feeding the first group of the

samples and the first target sample of the first set of samples to an Artificial Neural Network (ANN); (c) adjusting internal parameters of the ANN to minimize deviation of an ANN output from the target sample; (d) feeding a plurality of subsequent groups of samples and their respective target samples of the first set until the target sample is the last sample of the set, thereby continuously adjusting the internal parameters of the ANN upon comparing each subsequent ANN output to the respective target sample; (e) continuously re-feeding the previously processed groups of samples to gradually minimize an error function of the ANN between the ANN's output and the respective target value; (f) feeding a second set including a plurality of groups of samples and target samples to the ANN, thereby adjusting the internal parameters of the ANN in response to comparison between each new ANN output and a respective target sample; (f') simultaneously with the step (f) determining an ANN error function representing the difference between each ANN output and the respective target sample; (g) averaging the ANN error functions to determine an ANN estimated prediction error; (h) predicting future results from any processed group of samples different from the first and second sets by adjusting the ANN output with the estimated prediction error; and (i) outputting upper and lower error bounds of the adjusted ANN output at a given confidence level.

6. The method defined in claim 5 further comprising the steps of determining an expected trend of financial time series of subsequent samples representing each of the processed sets, removing the trend before processing of the groups of the respective set, and adding the trend before predicting the adjusted output.

8. A computer implemented method of training a recurrent artificial neural network (ANN) for prediction of a response in a time-variable financial series of values comprising the steps of: (a) collecting historical data comprised of a multiplicity of said values; (b) feeding the first group of said data to the recurrent ANN in a first training process; (c) adjusting weights and biases of the ANN in response to the first training process; (d) repeating steps (b) and (c) with additional groups of said values; (e) determining an error in successive values after said plurality of repetitions, wherein the ANN error represents the difference between each ANN output and a respective target sample; (f) averaging said error over a plurality of the values; (g) selecting a particular item for which a prediction of a response is desired; and (h) adjusting an output of ANN for the particular item with the determined average error.

15. The method defined in claim 8 wherein the time-variable financial series includes the group consisting of stock price series, bond price series, portfolios of securities, and volatility series.

17. An artificial neural prediction network system having a pipelined recurrent ANN (PRNN) architecture designed to train the ANN to predict with confidence, comprising: a computer; software executing on the computer for collecting a first set representing a nonlinear financial time series of subsequent samples of a financial quantity combined in a plurality of groups, wherein the first sample of a subsequent group is a target sample of the previous group; a database having the collected set of samples of the financial security; software executing on the computer for initially feeding the first group of the samples and the first target sample of the stored first set of samples; software executing on the computer for processing the first group of samples and for adjusting the internal parameters of the PRNN to minimize deviation of the output from the target sample; software executing on the computer for feeding a plurality of subsequent groups of samples and their respective target samples of the first stored set until the target sample is the last sample of the set, thereby continuously adjusting the internal parameters of the ANN upon comparing each subsequent output of the ANN to the respective target sample; software executing on the computer for continuously feeding the previously processed groups of samples to obtain a minimal level of the deviation between the ANN's output and the respective target value; software executing on the computer for storing a second set of groups of samples in the

database; software executing on the computer for determining a prediction error between an output of the ANN in response to feeding each of the groups of samples of the second set and the respective target value; software executing on the computer for averaging the prediction errors of the second set to obtain an estimated prediction error; software executing on the computer for predicting future results from any processed group of samples different from the first and second sets, each subsequent future result being adjusted in accordance with the estimated prediction error; and software executing on the computer for outputting upper and lower error bounds of the adjusted ANN output at a given confidence level.

18. The system defined in claim 17 further comprising software for determining an expected trend of financial time series of subsequent samples representing each of the processed sets, removing the trend before processing of the groups of the respective set, and adding the trend before predicting the adjusted output of a single security or a portfolio of securities.

21. A system employing a Recurrent ANN architecture (ANN) for prediction of a response in a time-variable financial series of values comprising: a computer; a database having a collected historical data comprised of a multiplicity of groups of successive time variable financial values; software executed on the computer for continuously feeding a first group of said collected historical data to the ANN and comparing each subsequent output of the ANN with a target value which is selected from the historical data in a first training process; software executed on the computer for adjusting weights and biases of the ANN in response to a plurality of repetitions of the first training process; software for continuously feeding at least one second group of said collected historical data to the ANN and comparing its output to a respective target value selected from the historical data in a second training process; software executed on the computer for adjusting weights and biases of the ANN in response to a plurality of repetitions of the second training process; software for feeding a third group of said stored data and determining an ANN prediction error function in response to comparing the third group of said data to a respective target value; software for selecting a particular item for which a prediction of a response is desired; and software for adjusting the output of ANN for the particular item with the determined prediction error.

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